CRITICAL ITEMS LIST SYSTEM: COMMUNICATIONS AND TRACKING SUBSYSTEM: SPACE TO SPACE COMMUNICATIONS SYSTEM ASSEMBLY: SPACE TO SPACE ORBITER RADIO (SSOR) ASS'Y P/N: SED16102581 APPROVAL DATE: SUPERCEDES REV: N/A DATE: N/A END ITEM EFFECTIVITY: OV102, OV103, 0V104, OV105, AND SUBS. SHEET | OF 4 PREPARED BY: Mark Chavez DATE: 4/19/00 APPROVAL: SR&MA: . DATE: DESIGN: Mark Chause Walliller 519 100 DATE: SSCS PROJECT MANAGER: Mott Lanke DATE: 5/9/00 CRITICALITY(H/F): 2/2 INTACT ABORT MODE CRIT: N/A REDUNDANCY SCREENS: A-N/A B-N/A C-N/A FMEA REFERENCE: SSOR-49 NAME: SSOR DRAWING REFERENCE: SED16102581 QUANTITY: I CIL# REV **FUNCTION** FAILURE MODE FAILURE EFFECT RATIONALE FOR ACCEPTABILITY AND CAUSE SSOR-49 BASIC (1) Provides RF FAILURE MODE: SUBSYSTEM: DESIGN: The electrical design of the SSOR duplex voice Short of telemetry Loss of Transmit is based upon ISC in-house engineering comm between peak detector and Receive Voice model bardware. Litton is manufacturing Orbiter and circuit Communications. the hardware in accordance with the EMU's. between Orbiter and appropriate NHB 5300.4 standards. CAUSE: Station or EMUs. (2) Receives Loss of commands Contamination. Passive FEE parts are selected from the biomed and vibration, shock, to Station. Loss of guidelines of MTL-STD-975. Active EEE telementy from EEE parts failure. data from EMU and are approved by the ISC Engineering EMU or temperature Station. Directorate Certified Parts Approval cycle Process. Passive components derated to (3) Provides RF INTERFACING: 60% stress, active op-amp derated to 80%. dupiex voice SUBSYSTEMS: Actual stress is less than 20% for passive comm between None components and less than 12.5% for active Orbiter and MISSION components (SSCS Electrical Stress Station PHASES: MISSION: Analysis Report JSC28928) Terminate EVA. (4) Provides RF Pre EVA Terminate Station command to rendezvous. CERTIFICATION: One time test on Qual Space Station EVA. SSOR. Power output measured before, and telemetry CREW/VEHICLE: during, and after exposure to environments. from Space Post EVA No effect. Station QUALIFICATION THERMAL TEST - 7 Station cycles from 25F to 135F operating and 1 SUCCESS PATHS Rendezvous cycle to -65F non-operating. RF output REMAINING measured before, during, and after thermal AFTER FIRST FAILURE: 0 PRESSURE TEST - 8 in (5.23 psta at 20si/minute repress/depress rate. Non-TIME TO EFFECT: operating excursion to 30 psia. RF output minutes measure before, during and after pressure

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| | | | CRITIC | AL ÍTEMS LIST | <u> </u> |
| SYSTEM: | COMM | UNICATIONS AND | | | TO SPACE COMMUNICATIONS SYSTEM |
| A CCESADO | rac una | OF 750 - D | | | |
| ASSEMBI | LY: SPA | CE TO SPACE ORI | BITER RADIO (SSOR |) ASS'Y P/N: SED | |
| | | | | | APPROVAL DATE: |
| END ff | 10M EFFE | CHVIIV. (M/16) | O\$/102 0\/104 0\/0 | As an arma | SUPERCEDES REV: N/A DATE: N/A |
| PREPARE | D BY: M | fark Chavez | , OV103, OV104, OV1 | 05, AND SUBS. | SHLET 3 OF 4 |
| APPROVA | | IAIR CHAVEZ | DA1 | E: 4/19/00 | |
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| | | REENS: A-N/A B | N/A C-N/A | INCT ABORT MODE | CRIT: N/A |
| FMEA RE | FERENCI | E: SSOR-49 | -IVIE G-IVIE | | <u> </u> |
| NAME: S | | | <u> </u> | | |
| DRAWING | G REFER | ENCE: SED16102: | 581 | | |
| QUANTITI | Y: 1 | | | | |
| CIL# | REV | FUNCTION | FAILURE MODE | FAILURE EFFECT | RATIONALE FOR ACCEPTABILITY |
| | | ļ | AND CAUSE | The state of the | EATTONALE FOR ACCEPTABILITY |
| SSOR-49 | BASIC | (1) Provides RF | FAILURE MODE: | SUBSYSTEM: | TEST: (CONTINUED) |
| | | duplex voice | Short of telemetry | Loss of Transmit | TEST: (CONTENDED) |
| | | comm between | peak detector | and Receive Voice | VIBRATION - 30 sec. per axis minimum |
| | ļ | Orbiter and | circuit | Communications | 20 Hz - 0.01 g ² /Hz |
| | | EMU's. | | between Orbiter and | 20 to 80 Hz - increasing 3 dB/oct |
| | | i | CAUSE: | Station or EMUs. | 80 to 350 Hz - constant 0.04 g ² /Hz |
| | | (2) Receives | Contamination, | Loss of commands | 350 to 2000 Hz -decreasing 3 dB/oct |
| | | biomed and | vibration, shock, | to Station. Loss of | RF Power Output measured before and after |
| | | telemetry from | EEE parts failure, | data from EMU and | each axis. |
| | | EMC | or temperature | Station. | |
| | | (3) Provides RF | cycle | | PREINSTALLATION ACCEPTANCE |
| | | duplex voice | | INTERFACING | TEST - Performed periodically at JSC prior |
| | | comin between | | SUBSYSTEMS: | to delivery of SSOR for Orbiter installation. |
| | | Orbiter and | | None | Includes complete electrical performance |
| | | Station | MISSION | MISSION: | with RF output power measured. Unit |
| | | | PHASES: | Terminate EVA. | operated approximately 40 hours during |
| | | (+) Provides RF | 1 | Terminate Station | acceptance testing. |
| 1 | | command to | Pre EVA | rendezvous. | GPOUND INTERMATION CONTRACT |
| | | Space Station | | | GROUND INTERVAL(OMDP) TEST: Interval (OMDP) checkout testing is |
| ٠., | | and relementy | EVA | CREW/VEHICLE: | accomplished in accordance with the |
| | i | from Space | | No effect. | OMRSD (V74). Tests in the OPF measure |
| | | Station | Post EVA | | RF power output. On the pad, functional |
| | | | | SUCCESS PATHS | verification of audio/RF, but not a |
| | | | Station | REMAINING | performance measurement of ourput power |
| | ļ | | Rendezvous | AFTER FIRST | during EMU checkout. |
| į | . ! | | | FAILURE: 0 | i |
| | i 🗼 i | | | ! | INSPECTION: The SSOR is manufactured |
| | . | | | TIME TO EFFECT: | in accordance with an approved Quality |
| | | | | minutes | Assurance Plan. Subassemblies are |
| | ! | | ¦ ' | | inspected for conformance with released |
| | i | | · | | drawings and smodards for pasts placement. |
| | ! | · | | | soldering, and cleanliness. |

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|-------------|----------------|----------------------|---------------------------|--------------------------|---|
| SYSTEM | COMM | UNICATIONS ANI | | AL ITEMS LIST | |
| 01312 | COMM | DIVICATIONS VIVI | O IKACKING S | UBSYSTEM: SPACE | TO SPACE COMMUNICATIONS SYSTEM |
| ASSEMBI | UY: SPAC | CE TO SPACE ORI | BITER RADIO (SSOR |) ASSTY P/N: SED | 16102521 |
| | | | | ASS TEN, SED | APPROVAL DATE: |
| | | | | | SUPERCEDES REV: N/A DATE: N/A |
| END II | EM EFFE | CTIVITY: OV 102 | , OV103, OV104, OV1 | 05, AND SUBS. | SHEET 4 OF 4 |
| PREPARE | D BY: M | lark Chavez | | E: 4/19/00 | OCELIA OF 4 |
| APPROVA | AL: | | | | · |
| SR&MA: | | _ | | _ | DATE: |
| DESIGN: | | - | | | DATE: |
| SSCS PRO | | | | | DATE: |
| CRITICAL | JTY(II/F |): 2/2 | | FACT ABORT MODE | CRIT: N/A |
| KEDUND, | ANCY SC | REENS: A-N/A B | -N/A C-N/A | | |
| | | E: SSOR-49 | | | <u> </u> |
| NAME: S | | | ** | | |
| QUANTIT | | ENCE: SED16102: | 581 | | |
| CIL# | REV | FUNCTION | T. 7 - 1 | J | |
| | RF, V | FUNCTION | FAILURE MODE AND CAUSE | FAILURE EFFECT | RATIONALE FOR ACCEPTABILITY |
| SSOR-49 | BASIC | (1) Provides RF | FAILURE MODE: | SUBSYSTEM: | FAILURE HISTORY: Current data can be |
| | | duplex voice | Short of telemetry | Loss of Transmit | found in PRACA database. |
| | i | comm between | peak detector | and Receive Voice | Total and to to to to database. |
| | ĺ | Orbiter and | circuit | Communications | |
| | | EMU's. | | between Orbiter and | OPERATIONAL USE: Crew is trained to |
| | | ļ | CAUSE: | Station or EMUs. | terminate EVA upon loss of all |
| | | (2) Receives | Contamination, | Loss of commands | communications with the Orbiter. |
| į | | biomed and | vibration, shock. | to Station. Loss of | Rendezvous is terminated with the Space |
| | | telemeny from | EEE parts failure. | data from EMU and | Station if communications are not |
| | | EMU | or temperature | Station. | established by the T1 rendezvous point. |
| | | l (3) Provides RF | cycle |) : D:TE base are are | |
| | | duplex voice | 1 | INTERFACING | |
| | | comm herween . | | SUBSYSTEMS: | |
| i | | Orbiter and | MISSION | None | · |
| į | | Station | PHASES: | MISSION: | i |
| | | | - 42 1525. | Lettninate EVA. | |
| | | (4) Provides RF | Pre EVA | Terminate Station | |
| | | command to | | rendezvous. | i |
| | | Space Station | EVA | | |
| ٠, | | and telemetry | j | CREW/VEHICLE. | |
| į | | from Space | Post EVA | No effect | |
| - 1 | | Station | | | ı |
| | | | Station | SUCCESS PATHS | |
| | į | | Rendezvous | REMAINING | |
| . | | | | AFTER FIRST | |
| | | | ! | FAILURE 0 | 1 |
| l | - ^ ; | | · | ''' | |
| | ! | ! | | TIME TO EFFECT. | |
| | -i | | <u></u> | ithinutes | |